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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Primary marine aerosol emissions from the Mediterranean Sea during pre-bloom and oligotrophic conditions: correlations to seawater chlorophyll a from a mesocosm study" *by* A. N. Schwier et al.

Anonymous Referee #3

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The authors report the effects of ocean biological parameters on the physical and chemical properties of primary marine aerosols for two different bloom conditions in the Mediterranean Sea (Bay of Calvi (BC) and Bay of Villefranche (BV) representative of non-bloom and pre-bloom conditions, respectively) using mesocosm experiments. Increase in pCO2 showed no direct effect on the physical parameters of the primary marine aerosols. The organic fraction and activation diameters for the pre-bloom conditions showed elevated numbers compared to non-bloom conditions. Chlorophyll a correlated with the increased organic fraction in sea spray aerosols. The increase in

organic fraction correlated well with an increased number fraction in Aitken mode during pre-bloom conditions.

General comments

Since the main objective of the paper is to compare number size distribution for high- and low-productivity episodes, more data/discussion need to be provided for the particle size distribution fittings. This is important part of the paper, yet there is only one figure and one table for " an average size distribution." Based on Fig. 2 I gather that the daily-averaged number fraction of DMPS lognormal modes changed considerably as a function of time for different mesocosms. For example, for BC on 06/29 Mode 1 fraction increased by more than 50% (and modes 2, 3, and 4 decreased correspondingly) for P6. For P3 and C3 changes were not so large. Similar picture is observed for BC on 07/02. The differences were also observed for BV (e.g., 02/23 and 03/03). Since the measurements were carried out continuously, I think the authors should show the errorbars for the variability in the number fraction of DMPS lognormal modes. It is important to clearly demonstrate that this variability in smaller than for example, the differences in Mode 2 particle fractions between BV and BC. Please also show the size distribution fittings separately for BC and BV, accompanied by appropriate statistics. This will help the reader to clearly see the influence of biological productivity on the Aitken mode.

The discussion regarding the role of organics for the increase in the Mode 2 particle fraction on page 26200, line 26 should either be removed or re-written. Chapter 3.1 gives no information to conclude that the increase in particle fraction can be attributed to organic material. The fact that other studies may have seen similar changes in lognormal mode distributions and attributed that to organics is not enough justification.

I strongly recommend removal of all the discussion regarding ocean acidification. The fact that some CO2 was pumped in seawater tells noting on how the ocean ecosystems, and therefore carbon content/speciation will change in future scenarios of elevated CO2 and changing climate. Such speculations can lead to the erroneous con-

clusions.

I do not believe I understand Figure 5. How were the error bars calculated? If there are no vertical error-bars (like for many P6 measurements) does that mean that within a day Ntot did not change at all?

According to the methods description, the covers were elevated to $\sim$10 cm above the top of the mesocosms, allowing air to circulate to avoid a confinement effect in the trapped water. I am just curios what was happening during "dangerous wind and wave conditions?" Unless some additional precautions were taken wouldn't seawater spillover into the mesocosms?

Specific comments

Page 26190, Line 4 (and elsewhere): Please change "sea salt" to sea spray when referring to primary marine aerosol emission.

Page 26190, Line 6: Please note that you are referring to particle diameter when using Dp.

Page 26190, Line 22: Please use the plural form of "organic".

Page 26193, Line 17: Please change "lower diameters" to "smaller diameters".

Page 26198, Line 24: Please define the two supersaturations used here and provide the reason behind the selection.

Page 26198, Line 24: Please add the temperature scale to "6°". Same for "3°" in Line 27.

Page 26199, Line 17: Please provide the data for particulate organic carbon concentrations to justify the argument that measured TOC is reported as DOC.

Interactive comment on Atmos. Chem. Phys. Discuss., 14, 26187, 2014.